The Center for Growth and Opportunity at Utah State University

Real Options Analysis Could Help Improve Regulatory Decisions

Author:

Will Rinehart[a]

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Growth and **Opportunity**
at Utah State University

Executive Summary

The Draft Circular A-4 proposes that real options analysis should be considered in "some situations . . . when you are regulating an exhaustible resource or an endangered species."[1] However, the Office of Management and Budget (OMB) should revise this guidance and encourage extensive use of the technique for benefit-cost analysis.

Regulatory real options analysis would ensure that agencies carefully consider three key aspects of regulation that are rarely discussed, including:

- *Irreversibility*, how easily a regulation could be revoked once implemented;

- *Uncertainty* over the future benefits and costs of the regulation; and

- *Timing* or the value in postponing action to get more information.

Altogether, real options analysis will invite more transparency in regulatory decisions. It won't stop every bad regulation, but it will encourage agencies to demonstrate the work they put into each regulation.

Regulatory real options

Real options analysis is a method that businesses use to value investment decisions. The method builds uncertainty into the analysis by assuming every business initiative comes with the ability, but not the obligation, to make a choice. For example, real options valuation could examine the opportunity to invest in the expansion of a firm's factory, as well as the alternative to wait to make a decision.

As Bronwyn Hall and Beethika Khan emphasized, "The most important thing to observe about this kind of decision is that at any point in time the choice being made is not a choice between adopting and not adopting but a choice between adopting now or deferring the decision until later."[2]

Economists Avinash Dixit and Robert Pindyck adapted this concept to understand how firms invest, or not, in the face of regulatory uncertainty. As they explained in the first chapter of their book on the subject,

> Most investment decisions share three important characteristics in varying degrees. First, the investment is partially or completely *irreversible*. In other words, the initial cost of investment is at least partially sunk; you cannot recover it all should you change your mind. Second, there is *uncertainty* over the future rewards from the investment. The best you can do is to assess the probabilities of the alternative outcomes that can mean greater or smaller profit (or loss) for your venture. Third, you have some leeway about the *timing* of your investment. You can postpone action to get more information (but never, of course, complete certainty) about the future.[3]

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1 Office of Management and Budget, "Circular A-4: Draft for Public Review," April 6, 2023, https://www.whitehouse.gov/wp-content/uploads/2023/04/DraftCircularA-4.pdf.

2 Bronwyn Hall and Beethika Khan, "Adoption of New Technology," *New Economy Handbook*, November 2002, https://eml.berkeley.edu/~bhhall/papers/HallKhan03%20diffusion.pdf

3 Avinash Dixit and Robert Pindyck, *Investment Under Uncertainty*, Princeton: Princeton University Press, 1994: 1–40, https://msuweb.montclair.edu/~lebelp/DixitPindyck1994.pdf.

The decision to regulate has clear corollaries with real options.

For one, regulatory decisions are difficult to reverse. It is rare for regulations to be stricken from the books, and in those cases where laws are changed, the affected industries are still exposed to potential regulation.[4] The regulatory sword of Damocles never stops swinging.

Second, the potential benefits and costs of a regulatory action are marked by uncertainty. While bill authors and agency implementors often have an expected outcome, the actual outcome can vary considerably. The difference between expected and actual outcomes means that the process of regulation is characterized by randomness. In the parlance of statistics, regulation is a stochastic process.

Finally, and most importantly, government bodies have some leeway about the timing of their regulatory decisions. In other words, regulation isn't just about regulating now or not regulating at all, but also about deferring the decision until later.

The benefits of regulatory real options

In the past decade, real options analysis has been applied sporadically to understand regulation.[5] Rightfully, the Draft Circular A-4 recognizes that this method of analysis could be a powerful tool. However, the Draft argues that it should be narrowly applied:

> In some situations, particularly where irreversibility is material to your analysis, such as when you are regulating an exhaustible resource or an endangered species, or when the timing of economic developments is central to your regulation's benefits and costs, it may be useful to analyze a regulation with uncertain effects as an option (referred to in the academic literature as "real options" analysis). The assessment of real options allows you to monetize the benefits and costs of changing the timing of regulatory effects in light of the value of information about potential states of the world that can be learned over time. The costs of shifting the timing of regulatory effects further into the future may be especially high when regulating to protect against irreversible harms. For example, a regulation that preserves a natural resource today may preserve option value associated with future uses of that resource that are unknown today. Over the duration of time that regulatory effects are deferred, you may learn additional information that reduces uncertainty about some of those regulatory effects. When uncertainty about the regulation's effects stems from a lack of data sources, you may want to collect appropriate data as part of regulatory action. Formal tools for assessing the value of additional information are well developed in the applied decision sciences and can be used when appropriate.[6]

Real options analysis has a wider application than just a couple of cases. Indeed, real options theory provides a more comprehensive and accurate explanation of the regulatory process. Because of this, it should be suggested for use in a wide range of cases.

For one, irreversibility isn't just material to a limited range of cases, like exhaustible resources or an endangered species. Irreversibility is a structural feature of the regulatory process itself. It is unusual for regulations to be reversed. In one of the few studies of this subject, Deloitte estimat-

4 Daphne Armstrong, Stephen Glaeser, and Jeffrey L. Hoopes, "Measuring Firm Exposure to Government Agencies," April 25, 2023, SSRN, http://dx.doi.org/10.2139/ssrn.4428258.

5 Joe Vladeck, "Valuing Regulatory Flexibility: A Real Options Approach to Cost-Benefit Analysis," *Georgetown Law Journal* 103, no. 3 (March 2015): 797–824.

6 Office of Management and Budget, "Circular A-4: Draft."

ed that over two-thirds (67.4%) of US regulations have never been updated since they were first passed.[7] Or, to take a more common example, the USA Patriot Act of 2001 was initially set to expire in 2005 but has been extended several times since then. Even bills with sunset provisions are reapproved.[8]

Second, real options analysis forces everyone to admit there is uncertainty in the process of implementing regulation. Bill authors and implementors within agencies often hold specific expectations regarding the outcome. However, the actual result can exhibit significant variations. These unforeseen consequences emphasize the presence of randomness within the regulatory process.

Yoon-Ho Alex Lee, who has been a tireless advocate of real options analysis, explained the importance of this viewpoint shift: "This implies, for example, that the net benefit of a regulation should be discussed in terms of its mean (expected value) and variance. It also implies that a discrepancy between the realized value of the regulation and its expected value does not necessarily indicate that the agency miscalculated the expected value."[9]

The Draft Circular A-4 has an expansive discussion of uncertainty as it relates to the measurement of costs and benefits but spends little time talking about uncertainty in the process as a whole. One of the clear benefits of real options is that it forces a reckoning with "the risk regarding the state of the world that would materialize if the proposed rule or policy were to be adopted." As Lee warns, the current method of analyzing effects tends to ignore the "inherent randomness to how the economy will evolve through a spontaneous order after the rule is implemented."

An emphasis on timing would be another benefit of widely adopting real options analysis because it would force agencies and decision-makers to spell out the value of not acting. Arrow and Fischer (1974) were the first to show that the irreversibility of some decisions imparts value to waiting for more information. The value of waiting for more information is now called the quasi-option value or QOV.

It is important to point out that QOVs don't mean that decision-makers must always wait for more information. It could be that the expected value of a regulation is still higher than the value that comes with delaying the decision. Rather, it simply forces everyone to be more transparent about the decision process and the value of time.

7 Daniel Byler, Beth Flores, and Jason Lewris, *Using Advanced Analytics to Drive Regulatory Reform: Understanding Presidential Orders on Regulation Reform,* Deloitte Center for Government Insights, 2017, https://www2.deloitte.com/content/dam/Deloitte/us/Documents/public-sector/us-ps-using-advanced-analytics-to-drive-regulatory-reform.pdf.

8 Brian Baugus, and Feler Bose, "Sunset Legislation in the States: Balancing the Legislature and the Executive," Mercatus Center at George Mason University, August 27, 2015, https://www.mercatus.org/research/research-papers/sunset-legislation-states-balancing-legislature-and-executive.

9 Yoon-Ho Alex Lee, "The Stochastic Nature of Cost-Benefit Analysis," *Yale Journal on Regulation*, *Notice and Comment* (blog), May 26, 2023, https://www.yalejreg.com/nc/the-stochastic-nature-of-cost-benefit-analysis-by-yoon-ho-alex-lee/.

The lessons of regulatory real options

The result of including real options analysis more broadly would be an expansion in the kinds of questions asked by lawmakers and regulators, including

- *Irreversibility*: How easily could this regulation be revoked once implemented? Once implemented are there built-in mechanisms for future rule revisions like sunset clauses?

- *Uncertainty*: Just how certain are the future benefits and costs of the regulation? What is the expected outcome, and how might that outcome vary?[10]

- *Timing*: What is the value in postponing action to get more information? Could experiments or regulatory sandboxes help to clarify the costs and benefits of a rule?

As a whole, real options analysis could be an important step in ensuring better regulations are adopted. It won't stop everything bad, but it will ensure a thorough discussion of the most important components.

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10 As Lee notes about variance: "When two reversible policy choices present similar or identical net expected benefits, the choice that exhibits a higher variance ought to be favored because this implies a higher upside benefit (with the understanding that the rule would be repealed if an inefficient state were to be realized). In particular, under a real-options approach, an agency could be justified in adopting the policy choice with a lower mean if the rule comes with a higher variance."